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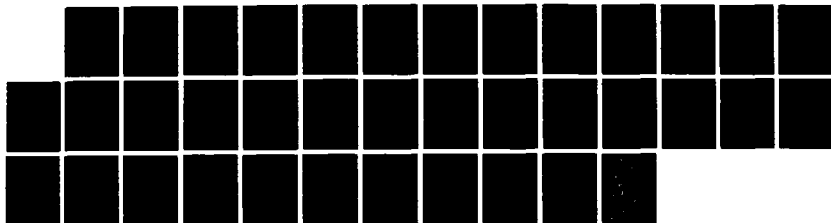
SOURCES OF DIGITAL SPATIAL DATA FOR GEOGRAPHIC  
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RESEARCH LAB (ARMY) CHAMPAIGN IL M O JOHNSON ET AL.  
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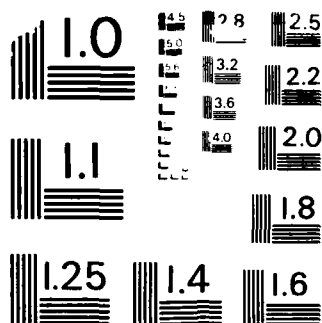
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**US Army Corps  
of Engineers**

Construction Engineering  
Research Laboratory

USA-CERL TECHNICAL REPORT N-88/01

December 1987

Training Management and Geographic Decision Support System

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# Sources of Digital Spatial Data for Geographic Information Systems

by  
Mark O. Johnson  
William D. Goran

Several computer programs are available to help Army installations plan military training activities while ensuring environmental quality and protecting natural resources. One such system, the Geographic Resources Analysis Support System (GRASS), requires digital spatial information for developing area-specific databases. This information previously was available only on a limited basis.

Today, many more digital spatial data sources have come into existence. Use of such sources, compared with generating new data, can usually save an installation a large amount of time and money. In addition, these sources ensure minimum standards for accuracy and quality.

This report identifies digital data sources to help installations evaluate the feasibility of implementing systems such as GRASS. Included is a list of the following characteristics for each source: format, scale/resolution, coverage, media, costs, and a textual description.

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|---|-------|---|--|---|-------------------------------|
| 1a REPORT SECURITY CLASSIFICATION<br><b>UNCLASSIFIED</b>  |       |   | 1b RESTRICTIVE MARKINGS  |   |                               |
| 2a SECURITY CLASSIFICATION AUTHORITY  |       |   | 3 DISTRIBUTION AVAILABILITY OF REPORT<br>Approved for public release; distribution is unlimited. |   |                               |
| 2b DECLASSIFICATION DOWNGRADING SCHEDULE  |       |   | 5 MONITORING ORGANIZATION REPORT NUMBER(S)   |   |                               |
| 4 PERFORMING ORGANIZATION REPORT NUMBER(S)<br>USA-CERL TR N-88/01   |       |   | 5a NAME OF MONITORING ORGANIZATION   |   |                               |
| 5a NAME OF PERFORMING ORGANIZATION<br>U.S. Army Construction Engr<br>Research Laboratory  |       | 5b OFFICE SYMBOL<br>(if applicable)   |  | 7a ADDRESS (City, State, and ZIP Code)                        |                               |
| 5c ADDRESS (City, State, and ZIP Code)<br>P.O. Box 4005<br>Champaign, IL 61820-1305   |       | 5d ADDRESS (City, State, and ZIP Code)  |  | 9 PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER                |                               |
| 8a NAME OF FUNDING SPONSORING ORGANIZATION<br>Office of the Chief of Engr   |       | 8b OFFICE SYMBOL<br>(if applicable)<br>DAEN-ZCF-B   |  | 10 SOURCE OF FUNDING NUMBERS                                  |                               |
| 8c ADDRESS (City, State, and ZIP Code)<br>20 Massachusetts Ave., N.W.<br>Washington, D.C. 20314-1000  |       | PROGRAM ELEMENT NO<br>4A162720  |  | PROJECT NO<br>A896  | TASK NO<br>A                  |
|   |       |   |  | WORK UNIT<br>ACCESSION NO<br>041                              |                               |
| 11 TITLE (Include Security Classification)<br>Sources of Digital Spatial Data for Geographic Information Systems (Unclassified)   |       |   |  |   |                               |
| 12 PERSONAL AUTHOR(S)<br>Johnson, Mark O.; Goran, William D.  |       |   |  |   |                               |
| 13a TYPE OF REPORT<br>Final   |       | 13b TIME COVERED<br>FROM _____ TO _____   |  | 14 DATE OF REPORT (Year Month Day)<br>December 1987           |                               |
| 15 PAGE COUNT<br>3  |       | 16 SUPPLEMENTARY NOTES<br>Copies are available from the National Technical Information Service<br>Springfield, VA 22161 |  |   |                               |
| 17 COSATI CODES   |       | 18 SUBJECT TERMS (Continue on reverse if necessary and identify by block number)  |  |   |                               |
| FIELD   | GROUP | SUB GROUP   | geography geographic information systems   |   |                               |
| 08  | 06    |   | digital data   |   |                               |
|   |       |   | directories  |   |                               |
| 19 ABSTRACT (Continue on reverse if necessary and identify by block number)<br>Several computer programs are available to help Army installations plan military training activities while ensuring environmental quality and protecting natural resources. One such system, the Geographic Resources Analysis Support System (GRASS), requires digital spatial information for developing area-specific databases. This information previously was available only on a limited basis.<br><br>Today, many more digital spatial data sources have come into existence. Use of such sources, compared with generating new data, can usually save an installation a large amount of time and money. In addition, these sources ensure minimum standards for accuracy and quality.<br><br>This report identifies digital data sources to help installations evaluate the feasibility of implementing systems such as GRASS. Included is a list of the following (Cont'd) |       |   |  |   |                               |
| 20 ABSTRACT SECURITY CLASSIFICATION<br><input type="checkbox"/> UNCLASSIFIED <input checked="" type="checkbox"/> CONFIDENTIAL <input type="checkbox"/> SECRET   |       |   | 21 ABSTRACT SECURITY CLASSIFICATION<br><b>UNCLASSIFIED</b>                                       |   |                               |
| 22 NAME OF PERFORMING ORGANIZATION<br>Dana Winney   |       |   | 23 TELEPHONE (Include Area Code)<br>(217) 352-6511 (Ext. 389)                                    |   | 24 OFFICE SYMBOL<br>CECER-INT |

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characteristics for each source: format, scale/resolution, coverage, media, costs, and a textual description.

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## FOREWORD

This work was performed by the U.S. Army Construction Engineering Research Laboratory (USA-CERL) under Project 4A162720A896, "Environmental Quality Technology"; Task A, "Installation Environmental Management Strategy"; Work Unit 041, "Training Management and Geographic Decision Support System." The work was conducted for the U.S. Army Engineering and Housing Support Center (EHSC). Mr. D. Bandel (CEHSC-ER) was the Technical Monitor.

The authors thank the following individuals for assistance in reviewing this document: Denis White, Harvard School of Design; Maurice Nyquist, National Park Service; and Keith Elliot, U.S. Geological Survey. In addition, persons who provided information for this report were: Albert Bargeski, National Oceanographic Data Center; Fred Broome, U.S. Bureau of the Census; Russ Carter, Central Intelligence Agency; and Christine Schomaker, National Geophysical Data Center.

The work was conducted by the USA-CERL Environmental Division (EN). Dr. R. K. Jain is Chief, USA-CERL-EN. The technical editor was Dana Finney, USA-CERL Information Management Office.

COL N. C. Hintz is Commander and Director of USA-CERL, and Dr. L. R. Shaffer is Technical Director.

Accession for

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# SOURCES OF DIGITAL SPATIAL DATA FOR GEOGRAPHIC INFORMATION SYSTEMS

## 1 INTRODUCTION

### Background

The Army is responsible for vast amounts of land that supports the military training mission. To ensure that training realism is optimal while protecting the environment and its natural resources, installation land managers and training planners must coordinate activities based on information about the local geography. In the past, it was nearly impossible to consider all critical factors in analyzing environmental impact because of the tremendous volume of data that had to be integrated manually. Now, however, computer technology allows quick, efficient data retrieval and manipulation, allowing planners to assess more information faster than was ever possible using manual methods.

The U. S. Army Construction Engineering Research Laboratory (USA-CERL) has developed several automated systems for evaluating environmental impact. Among these products is the Geographic Resources Analysis Support System (GRASS),<sup>1</sup> a geographic information system. GRASS provides efficient, comprehensive storage, retrieval, display, updating, and manipulation of environmental landscape data. The system produces graphic output based on maps and imagery. This type of output is especially useful to the installation because it offers visual representation to managers who are used to dealing with graphics. Critical information can be generated early enough in the planning process to ensure effective land use and resource management.

To use a computer system for this purpose, a database must be created which is tailored to conditions at the specific installation. In the case of GRASS, a digital data set must be obtained or generated for the region of interest. An earlier study by USA-CERL showed that existing digital information sources were limited.<sup>2</sup> Since that time, the availability of digital sources has increased markedly.

Installations considering the use of these systems must analyze the cost and time required to build an adequate database. For this reason, there is a need to document these new sources of digital data in terms of status, scope of information provided, procurement method, and cost. Incorporating existing data sources into the system usually saves a great amount of time and money. In addition, use of standard sources ensures a baseline for accuracy and quality.

### Objective

The objective of this work is to identify the major sources of national and global digital landscape data and to provide status, coverage, and acquisition information about these sources.

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1. J. Westervelt, et al., *GRASS User's Manual*, ADP Report N-87/22 (U.S. Army Construction Engineering Research Laboratory [USA-CERL], September 1987).

2. W. D. Goran and R. E. Riggins, *Graphic Materials to Support Biophysical Quantitative Environmental Impact Analysis--Sources of Existing Materials*, Technical Report N-68/ADA069097 (USA-CERL, March 1979).

## **Approach**

Sources were identified from existing documentation at USA-CERL and interviews with personnel experienced in digital database development. These data sources were contacted by telephone or correspondence to obtain the needed information. This information was then compiled to provide the following data characteristics: format, scale/resolution, coverage, media, costs, and textual descriptions and comments.

## **Scope**

Information in this report is current as of the last quarter in FY87.

## **Mode of Technology Transfer**

The information in this report will serve as an analytical tool in transferring USA-CERL's Geographic Information System (GIS). The GIS is being transferred to the field through hands-on experience, training programs, a user support center, newsletters, and other methods.

## **2 CATALOG OF DIGITAL DATA SOURCES**

A good first step in determining the type and extent of digital data available for a specific region is to contact the National Cartographic Information Center (NCIC) and ask for a listing of data for your area. (National and regional addresses for NCIC are found in the Appendix.) NCIC maintains an updated list of all digital spatial data sources in the United States and offers a search service for specified geographic regions. NCIC also can supply indexes showing the status of coverage in your area.

Information collected in this study is presented in catalog format for quick reference. The Appendix also contains a cross reference for these sources.

## **DMA: Elevation**

### **Data Source**

Defense Mapping Agency (DMA) Aerospace Center  
3200 S. 2nd St.  
St. Louis, MO 63118-3399

### **Data Format**

Raster

### **Scale**

1:250,000

### **Data Coverage**

Entire United States and many other parts of the world.

### **Data Description**

Data consist of a regular array of elevation values, latitude/longitude, referenced with a spacing of 3 arc-seconds. Data were produced from digitizing 1:250,000 topographic maps. For more information, refer to U.S. Geological Survey (USGS) Circular 895-B, *Digital Elevation Models (DEMs)*, which describes both the USGS- and DMA-produced DEMs.

### **Media**

Non-Government parties order data through USGS. The data are available on 9-track tape, 1600 bpi.

### **Acquisition Costs**

USGS: \$75/1 deg. x 1 deg. block, plus \$25 service charge.

### **Comments**

For more information or to receive a copy of circular 895-B, contact USGS (address is in the Appendix).

## **EOSAT: Multispectral—Satellite**

### **Data Source**

Earth Observation Satellite Co. (EOSAT)  
4300 Forbes Blvd.  
Landham, MD 20706  
Telephone: 1-800-367-2801

### **Data Format**

#### **Multispectral scanner (MSS):**

Band interleaved (through 1/79) (BIP)  
Band sequential (BSQ) or band interleaved (BIL) corrected (1/79 to 5/81)  
BSQ or BIL corrected or uncorrected (6/81 - present)

#### **Thematic mapper (TM):**

BSQ or BIL corrected or uncorrected (4/84 - present)

#### **Reverse band video (RBV):**

Scene sequential (SSQ) corrected (9/80 - present)

### **Scale/Resolution**

MSS  $\approx$  80m, TM  $\approx$  30m, RBV  $\approx$  80m

### **Data Coverage**

Worldwide. Historical data can be obtained through the Earth Resources Observation System (EROS) Data Center.

### **Data Description**

Standard 4-band MSS, 7-band TM data, or RBV data. Since the Landsat system has been commercialized, users must sign a form stating that they will not copy or distribute the data without authorization from EOSAT.

### **Media**

9-track tape, 6250 or 1600 bpi.

### **Acquisition Costs**

| <u>Product</u>   | <u>Cost</u> |
|------------------|-------------|
| MSS              | \$660       |
| MSS Copies       | \$120*      |
| RBV Sub-scene    | \$660       |
| RBV 4 Sub-scenes | \$1320      |
| TM Full Scene    | \$3300      |
| TM Copies        | \$720**     |
| TM Quarter Scene | \$1650***   |

*Comment*

\*Information is from pamphlet EOSAT 205-5, *Landsat Products and Services*.  
Note: military users are now required to purchase EOSAT data through the DMA.

\*\*Copies are available only at the time of the original order and no more than 10 copies are allowed.

\*\*\*Quarter scenes are available only from stock in-house at the EROS Data Center.

## **EPA: Multispectral--Airborne**

### *Data Source*

Environmental Protection Agency (EPA)  
Remote Sensing Branch  
P.O. Box 15027  
Las Vegas, NV 89114

### *Data Format*

MSS--BIL

### *Scale*

Customer-variable

### *Data Coverage*

Customer-variable

### *Data Description*

The EPA has an aircraft-mounted multispectral 12-channel scanner (Daedalus 2600 ATM) available for contract data collection. The customer has control over the area of coverage, resolution of data, and wavelengths to be collected.

### *Media*

Custom flights

### *Acquisition Costs*

A Corps of Engineers Southwest Division project yielded the following averages:

| <u>Resolution</u> | <u>Price/Sq Mi</u> | <u>Price/acre</u> |
|-------------------|--------------------|-------------------|
| 5 m               | \$75.84            | \$0.12            |
| 10 m              | \$14.15            | \$0.022           |

Note: about half of the cost is due to acquiring one set of color infrared (IR) photographs.

### *Comments*

Information was obtained from *Southwest Division Remote Sensing Bulletin*, Remote Sensing Activities and Status Report (23 October 1984). Cost estimates were provided by Mr. Gary Earls, Southwest Division Remote Sensing Coordinator.

## **NCDC: Weather—Statistics and Imagery**

### ***Data Source***

National Climatic Data Center (NCDC)  
Federal Bldg.  
Asheville, NC 28801  
Telephone: 704-CLIMATE

### ***Data Format***

Digital products--tabular records

Satellite products--raster

### ***Scale***

Variable

### ***Data Coverage***

Mostly United States. Some global and regional data also available.

### ***Data Description***

Digital products--surface marine and air observations, hourly precipitation data, lightning statistics from storm data, U.S. soil temperatures, world monthly weather record (surface and upper air), and more.

Satellite products--AVHRR, SEASAT Altimeter and SAR, sea surface temperature, TIR OS-N, and more.

### ***Media***

9-track American Standard Code for Information Interchange (ASCII) or EBCDIC tape, 1600 or 6250 bpi

### ***Acquisition Costs***

Magnetic tape data--\$99/order minimum.

### ***Comments***

For more information, contact the above address for the *Selective Guide to Climatic Data Sources*.



## **NGDC: Terrestrial and Marine Geophysical Data**

### *Data Source*

National Geophysical Data Center (NGDC)  
ATTN: Christine Schomaker  
325 Broadway  
Boulder, CO 80303  
Telephone: (303) 497-6474; FTS 320-6376

### *Data Format*

Varies

### *Scale*

Varies

### *Data Coverage*

Mostly worldwide; some data specific to U.S. coastal waters

### *Data Description*

Aeromagnetic and geomagnetic data; oil and gas lease data; ocean core sample locations; ocean bottom characteristics; dangers to navigation; coastal, deepwater, or gridded bathymetry; land and marine seismic data; geothermal data; land and marine geology; satellite data (Aurora, GEOS/NOAA, LANDSAT, MAGSAT); solar data; land and marine topography. All data are latitude/longitude referenced.

### *Media*

9-track tape (ASCII or EBCDIC), computer listing, or plots

### *Acquisition Costs*

Varies; call/write for quotes.

### *Comments*

NGDC is part of the National Environmental Satellite Data and Information Service (NESDIS). Information was obtained from the following NGDC publications: *Solar-Terrestrial Physics Services and Publications*; *Terrestrial Geophysics Data Services*; *Marine Geology and Geophysics Data Services and Publications*; and *Earthquake Data Services and Publications*.

## **NGIC: Geodetic Control Information**

### ***Data Source***

National Geodetic Information Center (NGIC)  
Rockville, MD 20852  
Telephone: (301) 443-8631 (geodetic data), or - 8316 (Digital Data Catalog)

### ***Data Format***

Tabular

### ***Scale***

Not applicable

### ***Data Coverage***

Entire United States

### ***Data Description***

A digital database of geographic control points on the Earth's surface with specified latitude, longitude, and elevation values. Horizontal, vertical, and gravimetric data can be referenced by maximum/minimum latitude/longitude, state, or quad identifications (IDs).

### ***Media***

Information can be supplied on computer tape, printout, or, for horizontal data, direct access is available (see *Comments* below).

### ***Acquisition Costs***

Approximately \$150-200/format for a state on 9-track tape. Computer printouts of the same data are less expensive. For costs associated with direct access, call the telephone number given below.

### ***Comments***

For information on direct access, call National Geodetic Survey (NGS) Systems Development Branch at (301) 443-8380. For more information about formats, costs, and availability, write/call the NGIC at the above address and ask for the *National Geodetic Survey—Digital Data Base Products*.

## **NODC: Marine—Physical, Biological, and Chemical Data**

### ***Data Source***

National Oceanographic Data Center (NODC)  
ATTN: Albert Bargeski--Chief of User Services  
Page Bldg 1  
2001 Wisconsin Ave., N.W.  
Washington, DC 20235  
Telephone: (202) 634-7500

### ***Data Format***

Mostly tabular records. Digital file format examples can be found in the *NODC Users Guide*.

### ***Scale***

Not applicable

### ***Data Coverage***

Mostly regional (Gulf Coast, Alaskan Coast, etc.). A considerable amount of global data is also available. See *NODC Users Guide* for specific areas and time periods.

### ***Data Description***

Measurements versus depth of: temperature, salinity, dissolved oxygen, and other physical parameters. Environmental parameters include metals, hydrocarbons, and other pollutants. Biological observations cover fish, marine birds and mammals, plankton, and other organisms. For detailed information about NODC holdings, see the *NODC Users Guide*.

### ***Media***

9-track magnetic tape, computer printout, or computer-generated plots.

### ***Acquisition Costs***

1. Magnetic tapes:
  - \$85 minimum computer charge for 800 to 1600 bpi
  - \$100 minimum computer charge for 6250 bpi
  - \$20 for blank tapes (user can provide own tapes)
2. Computer printout: \$0.05/sheet plus computer charges
3. Plotter operations: \$20/hr plus \$30/roll or \$1/plot
4. Handling charges: \$3 (nondigital products), \$10 (digital products)

### *Comments*

The NODC can provide specific information about data based on combinations of the following parameters: data type, geographic area, time period, cruise number, ship or platform, country, institution, minimum depth, effective depth, and taxonomy. The Oceanographic Station Data File and the Marine Toxic Substances and Pollutants File can also be searched by parameters such as pH and dissolved oxygen. See Section 5.0, page 2, of the *NODC Users Guide*. The NODC is part of NESDIS. This information was obtained from the *NODC Users Guide*.

## **NTIS: Small Scale World Boundaries, Major Rivers**

### *Data Source*

National Technical Information Service (NTIS)  
U.S. Dept. of Commerce  
5285 Port Royal Rd.  
Springfield, VA 22161  
Telephone: (703) 487-4650

### *Data Format*

Vector (points, lines)

### *Scale/Resolution*

1:12,000,000; 1:3,000,000, and larger

### *Data Coverage*

Worldwide

### *Data Description*

World Data Bank I--coast lines, national boundaries, and place names at 1:12,000,000 scale. World Data Bank II\*--coast lines, major rivers, national boundaries, state/province boundaries, and place names at 1:3,000,000 or larger. Data are latitude/longitude referenced.

### *Media*

9-track, 1600-bpi, odd parity, EBCDIC magnetic tape

### *Acquisition Costs*

Data are available free of charge from the Central Intelligence Agency (CIA) to Federal agencies (see *Comments* below). You must send a letter of request on official letterhead from your organization designating area of interest and enough 1/2-in. tapes to hold the data (the whole data base will take 10 tapes). Non-Government parties may obtain current price information by calling NTIS.

### *Comments*

Data were originally collected by the CIA Office of Geographic and Cartographic Research. Information about this source was obtained from a report entitled

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\*Note: according to sources in the CIA, the copy of World Data Bank II distributed by NTIS is not as complete as that of the CIA's.

*U.S. National Report to ICA, 1984, Section 5, "Automation in Cartography," subsection "Data Bases."* In addition, the following individual provided information by telephone:

Mr. Russ Carter  
CIA  
Office of Geographic and Cartographic Research  
Room GH55  
OCPAS/CDPG  
Washington, DC 20505

## **ORNL: County Level Data**

### *Data Source*

Oak Ridge National Laboratory (ORNL)  
ATTN: R. J. Olson, C. J. Emerson, or M. K. Nungesser  
Oak Ridge, TN 37830

### *Data Format*

Tabular--Statistical Analysis System (SAS) format

### *Scale*

Stored at county level

### *Data Coverage*

Conterminous United States

### *Data Description*

This database contains a single representative county value for these categories:

1. Agriculture--crop and livestock sales, yields, etc.
2. Base data--state and county names, Federal and State landownership, etc.
3. Climate--monthly average (temperature, precipitation), growing season length, etc.
4. Vegetation--tree species ranges, potential and adjusted vegetation, etc.
5. Forestry--major types, sawtimber volumes, growing stock volumes, etc.
6. General--supporting data
7. Air quality--ambient air quality, air quality nonattainment areas, etc.
8. Land--land use, seismic risk ratings, land surface mining, etc.
9. Natural areas--national parks, wilderness areas, etc.
10. Population--by sex and 5-yr age classes, projected for 1985 and 2000
11. Water resources--water quality National Stream Quality Accounting Network (NASQAN)
12. Terrain (East only)--lithology, elevation, geology, soils, etc.
13. Wildlife--bird routes, mammal information, endangered species information, etc.

### *Media*

9-track tape in SAS format or EBCDIC tape files

### *Acquisition Costs*

No information available

### *Comments*

For more information, write to ORNL at the above address for the report *GEOECOLOGY--A County-Level Environmental Data Base for the Conterminous United States*.

## **SCS: Soils**

### *Data Source*

Soil Conservation Service (SCS)  
National Cartographic Center  
ATTN: Richard Folsche  
South Technical Service Center  
P.O. Box 6567  
Fort Worth, TX 76115

### *Data Format*

Raster encoded as ASCII

### *Scale/Resolution*

Vector: mostly 1:24,000

Raster: mostly 4-hectare cells

### *Data Coverage*

Scattered. Call/write SCS at the above address for a current edition of *Status of Detailed Soil Survey Digitizing* or *Status of Soil Survey Digitizing*.

### *Data Description*

This is an experimental program to provide vector and grid-cell soils data. Data are available on a county basis. The program was funded by state SCS offices; thus, extensive data are available for some states, and none for others.

### *Media*

9-track tape, 800 bpi

### *Acquisition Costs*

The SCS has not established a distribution system, so data are provided on a case-by-case basis. For areas that have not been digitized, cost-sharing information may be available from individual state soil conservationists.

### *Comments*

Information was obtained from conversations and reports provided by Richard Folsche and Arnold Molina, SCS South Technical Service Center. For more information, write to the above address or contact:

National GIS Coordinator  
Cartography and Geographic Information Systems Div.  
14th and Independence Ave., SW  
P.O. Box 2890  
Washington, DC 20013  
Telephone: FTS 447-5420



## **SPOT: Multispectral--Satellite**

### *Data Source*

SPOT Image Corp.  
1897 Preston White Dr.  
Reston, VA 22091-4326  
Telephone: (703) 620-2200

### *Data Format*

Raster

### *Scale/Resolution*

10-m panchromatic or 20-m multispectral

### *Data Coverage*

Worldwide, though historical data are not yet extensive.

### *Data Description*

The SPOT satellite multispectral data are essentially the same as those used by bands 2, 3, and 4 of the Landsat-5 Thematic Mapper. However, SPOT's multispectral data have a resolution of 20 m versus Landsat's 30 m. SPOT also has a panchromatic band with a resolution of 10 m and stereo image acquisition capability.

### *Media*

9-track tape, 6250/1600 bpi

### *Acquisition Costs*

|                         | <u>6250 bpi</u> | <u>1600 bpi</u> |
|-------------------------|-----------------|-----------------|
| Unreferenced (Level 1)  | \$1475          | \$1600          |
| Georeferenced (Level 2) | \$2425          | \$2550          |

### *Comments*

Level 2 SPOT data can be referenced to several projections (e.g., Lambert Conformal, UTM, and Polyconic) or to another SPOT scene (Level S). If no maps of the area are available, the customer will be asked to supply maps at a scale of 1:100,000 or larger for ground control points.

The following nonstandard options are available for an additional \$100 per item:

- BSQ rather than BIL
- EBCDIC rather than ASCII
- Split record size with maximum length of 3960 bytes (available only for 1600-bpi tapes)

For ordering and current prices, call/write the above address. This information was obtained from "SPOT Image Corporation--Forms Instructions."

## **EPA: Water Quality (STORET)**

### *Data Source*

U.S. Environmental Protection Agency (USEPA)  
Office of Water and Hazardous Materials  
401 M Street, SW  
Washington, DC 20460  
Telephone: (202) 426-7792

### *Data Format*

Tabular

### *Scale*

Not applicable

### *Data Coverage*

Approximately 200,000 collection points nationwide

### *Data Description*

STORET is a national system that can help users monitor water quality trends, measure compliance with water quality standards, trace pollutants, and file water quality reports, budget requests, and management basin plans.

### *Media*

Direct terminal access, or data can be sent from Washington in report form and on machine-readable tapes.

### *Acquisition Costs*

One-time requests can be processed at no charge. Regular users can set up interagency fund transfers or a time-sharing service with USEPA. Average charges per use are \$3 to \$6.

### *Comments*

Additional documentation includes: *An Introduction to STORET for Water Quality Trend Analysis*, *STORET EPA's Computerized Water Quality Data Base*, and *STORET User Handbook*.

## **USBC: Political/Census Boundaries, Streets, and Names**

### *Data Source*

U.S. Bureau of the Census (USBC)  
Geography Division  
ATTN: Fred Broome  
Washington, DC 20233

### *Data Format*

GBF/DIME: vector--latitude/longitude, or state plane-referenced polygons, lines, and points

TIGER: vector--UTM referenced polygons, lines, and points

### *Scale*

Mostly 1:24,000

### *Data Coverage*

278 Standard Metropolitan Statistical Areas (SMSAs)

### *Data Description*

GBF/DIME: political boundaries, streets, street names/addresses, zip codes, census divisions, railroads, and streams

TIGER: USGS digital line graph (DLG) data supplemented with GBF/DIME information. This data set is not scheduled for release until 1990.

### *Media*

GBF/DIME: 1600- or 6250-bpi tapes

TIGER: proposed 6250-bpi tapes, CD packs

### *Acquisition Costs*

Prices vary according to the size of the SMSA file, which can range from 3000 to 226,000 records. Contact Customer Service for prices in your area of interest. Prices have not yet been developed for TIGER.

### *Comments*

The USBC Customer Service telephone number is (301) 763-4100.

## **USGS: Topological—Land Use/Land Cover, Watersheds**

### *Data Source*

National Cartographic Information Center  
U.S. Geological Survey (USGS)  
User Services Section  
507 National Center  
Reston, VA 22092  
Telephone: (703) 860-6045

### *Data Format*

Vector files in GIRAS format

Raster available in binary or character (ASCII or EBCDIC) form

### *Scale/Resolution*

Vector--1:100,000; 1:250,000

Raster--200 meters

### *Data Coverage*

For information on coverage, write/call NCIC for a copy of the latest edition of *Index to Land Use and Land Cover Information*.

### *Data Description*

Separate data files are available for the following:

- Land use/land cover
- Political units
- Census county subdivisions
- Hydrologic units (watersheds)
- Federal land ownership (park, forest, etc.)

A Composite Theme Grid (CTG) is also available which contains all themes (land use, census, etc.) available for a given area. For more information about file format, contact USGS at the above address for Circular 895-E, *Land Use and Land Cover Digital Data*.

### *Media*

9-track ASCII tapes and paper maps

### *Acquisition Costs*

- Land use/land cover, \$100
- Census tracts, \$50
- Political boundaries, hydrologic units, and Federal lands, \$35
- CTG, \$250

### *Comments*

Data are provided in an arc-node format known as GIRAS. Programs are available for converting this format to the DLG standard. For more information about GIRAS-to-DLG conversion, contact USGS at the above address.

## **USGS: Topological—Boundaries, Transportation**

### *Data Source*

National Cartographic Information Center  
U.S. Geological Survey  
User Services Section  
507 National Center  
Reston, VA 22092  
Telephone: (703) 860-6045

### *Data Format*

Vector files in DLG format

### *Scale*

1:24,000; 1:100,000; 1:2,000,000

### *Data Coverage*

1:2,000,000 data are available for the entire United States. 1:24,000 and 1:100,000 data are not as well developed. For current coverage, write/call NCIC for the latest edition of *Index to Digital Line Graph and Digital Elevation Model Data*.

### *Data Description*

- Boundaries (state, county, Federal)
- Transportation (roads, railroads, airports)
- Hydrographic (streams and water bodies)

### *Media*

9-track magnetic tape and/or paper maps

### *Acquisition Costs*

- 1:2,000,000 boundary, transportation, or hydrography--\$100/section
- 1:24,000/100,000 boundary--\$20/section; transportation or hydrography--\$50/section
- Service charge of \$25/tape

### *Comments*

Shared cost arrangements are possible for areas with no coverage. Source document: U.S. GeoData Price List (8/84), USGS Circulars 895-C and 895-D, *Digital Line Graphs From 1:24,000 and 1:2,000,000 Scale Maps*. For more information on USGS digital products and standards, contact the Survey for copies of the *USGS Digital Cartographic Data Standards* and the following USGS circulars:

- 895-A, *Overview and USGS Activities*
- 895-B, *Digital Elevation Models*
- 895-C, *Digital Line Graphs From 1:24,000 Scale Maps*
- 895-D, *Digital Lines Graphs From 1:2,000,000 Scale Maps*
- 895-E, *Land Use and Land Cover Digital Data*
- 895-F, *Geographic Names Information System*
- 895-G, *Digital Line Graph Attribute Coding Standards*.

## **USGS: Elevation**

### ***Data Source***

National Cartographic Information Center  
U.S. Geological Survey  
User Services Section  
507 National Center  
Reston, VA 22092  
Telephone: (703) 860-6045

### ***Data Format***

Raster

### ***Scale***

1:24,000

### ***Data Coverage***

Scattered quads throughout the United States. For current coverage, write/call USGS for the *Index to Digital Line Graph and Digital Elevation Model Data*.

### ***Data Description***

A regular array of elevation values referenced to the universal transverse mercator (UTM) coordinate system with a spacing of 30 m. Data are collected either by digitizing 7.5-ft contour overlays or by scanning photographs. The data are available in one of three levels:

- Level 1--raw elevation data, only gross errors edited
- Level 2--data smoothed and edited to remove random errors
- Level 3--data edited and modified to ensure positional accuracy.

### ***Media***

9-track magnetic tape and/or paper maps

### ***Acquisition Costs***

\$100/quad with a \$25/tape service charge

### ***Comments***

NCIC/USGS also distributes digital elevation data produced by the DMA. These data have a scale of 1:250,000, are latitude/longitude referenced, and have a sampling interval of 3 arc-seconds. For more information, see the previous section on the DMA. This information was obtained from USGS Circular 895-B, *Digital Elevation Models*.

## **USGS: Names—Areas, Maps**

### *Data Source*

National Cartographic Information Center  
U.S. Geological Survey  
User Services Section  
507 National Center  
Reston, VA 22092  
Telephone: (703) 860-6045

### *Data Format*

Tabular

### *Scale*

Not applicable

### *Data Coverage*

Entire United States

### *Data Description*

Geographic Names Information System (GNIS) is a database containing the following data elements:

- National Geographic Names Database--58 state files containing names and other information compiled from topographic maps for states, territories, and District of Columbia.
- USGS Topographic Map Names Database--57 separate files: 56 for 1:24,000 topographic map names of the states and territories, and one file for 1:100,000 and 1:250,000 scale maps.
- Generic Database--a research/reference tool and repository of reference information for the GNIS.
- National Atlas Database--designed to be an abridged version of the National Geographic Names Database.
- Board on Geographic Names Database--information regarding the investigations and decisions of the U.S. Board on Geographic Names.

### *Media*

9-track tape, 1600 bpi

### *Acquisition Costs*

\$50/state

### *Comments*

For more information, write/call USGS at the above address for Circular 895-F, *Geographic Names Information System*.



### 3 CONCLUSION

This report has presented national and global sources of digital spatial data. More sources may be available at state agencies such as transportation, environmental, and natural resource management departments. Also, local planning offices, university geography, urban planning, and civil engineering departments may be able to provide digital data.

**APPENDIX:****CROSS REFERENCE OF DATA SOURCES AND NCIC ADDRESSES**

| <b>CARTOGRAPHIC INFORMATION</b>  |   |
|--|---|
| <b>Major Category - Subdivision</b>  | <b>References</b>                         |
| <b>Elevation</b> <ul style="list-style-type: none"><li>- Terrestrial</li><li>- Marine (bathymetry)</li></ul>   | DMA, USGS, NGDC<br>NGDC                   |
| <b>Imagery</b> <ul style="list-style-type: none"><li>- Satellite<ul style="list-style-type: none"><li>&gt; Multispectral</li><li>&gt; Weather</li></ul></li><li>- Airborne<ul style="list-style-type: none"><li>&gt; Multispectral</li></ul></li></ul> | SPOT, EOSAT, NGDC<br>NODC NGDC<br><br>EPA |
| <b>Geomorphic</b> <ul style="list-style-type: none"><li>- Seismic</li><li>- Soils</li><li>- Geology</li></ul>  | NGDC<br>SCS<br>NGDC                       |
| <b>Topological</b> <ul style="list-style-type: none"><li>- Land use/land cover</li><li>- Political/census boundaries</li><li>- Hydrologic units</li><li>- Transportation</li></ul>   | USGS<br>USGS, USBC<br>USGS<br>USGS        |

## TABULAR INFORMATION

| Major Category - Subdivision  | References                                     |
|---|--|
| Elevation<br>- Terrestrial  | ORNL, NGIC                                     |
| Geomorphic<br>- Seismic<br>- Soils<br>- Geology   | NGDC<br><br>SCS<br><br>NGDC                    |
| Topological<br>- Land use/land cover<br>- Political/census boundaries<br>- Hydrologic units<br>- Transportation | USGS<br><br>USGS, USBC<br><br>USGS<br><br>USGS |

### National Cartographic Information Center Addresses

#### National

NCIC Information Center  
U.S. Geological Survey  
507 National Center  
Reston, VA 22092  
Telephone: (703) 860-6336

#### Regional

Eastern Mapping Center  
U.S. Geological Survey  
536 National Center  
Reston, VA 22092  
Telephone: (703) 860-6336

Mid-Continent Mapping Center  
U.S. Geological Survey  
1400 Independence Rd.  
Rolla, MO 65401  
Telephone: (314) 341-0851

NCIC  
U.S. Geological Survey  
National Space Technology Laboratories  
NSTL Station, MS 39529  
Telephone: (601) 688-3544

Rocky Mountain Mapping Center  
U.S. Geological Survey  
Box 25046, Stop 504 Federal Center  
Denver, CO 80225  
Telephone: (303) 234-2326

Western Mapping Center  
U.S. Geological Survey  
345 Middlefield Rd.  
Menlo Park, CA 94025  
Phone: (415) 323-8111,  
ext 2427

Alaska Office-NCIC  
U.S. Geological Survey  
Skyline Bldg., 218 "E" St.  
Anchorage, AK 99501  
Phone: (907) 271-4148

## ABBREVIATIONS

|         |   |
|---------|---|
| ASCII:  | American Standard Code for Information Interchange            |
| BIL:    | band interleaved (1/79 - 5/81)                                |
| BIP:    | band interleaved (through 1/79)                               |
| BSQ:    | band sequential   |
| CIA:    | Central Intelligence Agency                                   |
| CTG:    | composite theme grid  |
| DEM:    | digital elevation model                                       |
| DLG:    | digital line graph  |
| DMA:    | Defense Mapping Agency  |
| EOSAT:  | Earth Observation Satellite Co.                               |
| EROS:   | Earth Resources Observation System                            |
| GBF:    | Geographic Binary File  |
| GIRAS:  | Geographic Information Retrieval and Analysis System          |
| GIS:    | Geographic Information System                                 |
| GNIS:   | Geographic Names Information System                           |
| GRASS:  | Graphic Resources Analysis Support System                     |
| IR:     | infrared  |
| MSS:    | multispectral scanner   |
| NASQAN: | National Stream Quality Accounting Network                    |
| NCDC:   | National Climatic Data Center                                 |
| NCIC:   | National Cartographic Information Center                      |
| NESDIS: | National Environmental Satellite Data and Information Service |
| NGDC:   | National Geophysical Data Center                              |
| NGIC:   | National Geodetic Information Center                          |
| NGS:    | National Geodetic Survey                                      |
| NODC:   | National Oceanographic Data Center                            |
| NTIS:   | National Technical Information Service                        |
| OCE:    | Office of the Chief of Engineers                              |
| ORNL:   | Oak Ridge National Laboratory                                 |
| RBV:    | reverse band video  |
| SAS:    | Statistical Analysis System                                   |
| SCS:    | Soil Conservation Service                                     |
| SMSA:   | Standard Metropolitan Statistical Area                        |
| SSQ:    | scene sequential  |

TM: thematic mapper  
USA-CERL: U.S. Army Construction Engineering Research Laboratory  
USBC: U.S. Bureau of the Census  
USEPA: U.S. Environmental Protection Agency  
USGS: U.S. Geological Survey  
UTM: universal transverse mercator  
bpi: bits per inch

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